We_claim:

1. A trench capacitor, comprising:

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a substrate formed with a trench;

said trench having an upper region and a lower region;

an insulation collar formed in said upper region;

a buried well formed in said substrate, said lower region at least partly extending through said buried well;

a dielectric layer of tungsten oxide for lining said lower region, said dielectric layer serving as a capacitor dielectric; and

a conductive trench filling disposed in said trench.

- 2. The trench capacitor according to claim 1, wherein said conductive trench filling is a tungsten-containing material.
- 3. The trench capacitor according to claim 1, wherein said dielectric layer has a dielectric constant greater than 50.



- 4. The trench capacitor according to claim 1, including a barrier layer disposed between said dielectric layer and said substrate.
- 5. The trench capacitor according to claim 1, including a barrier layer disposed between said dielectric layer and said conductive trench filling.
- 6. The trench capacitor according to claim 1, including:
- a barrier layer disposed between said dielectric layer and said substrate; and
- a further barrier layer disposed between said dielectric layer and said conductive trench filling.
- 7. The trench capacitor according to claim 4, wherein said barrier layer is formed of a material selected from the group consisting of silicon oxide, silicon nitride, oxynitride, tungsten nitride, titanium nitride, and tantalum nitride.
- 8. The trench capacitor according to claim 5, wherein said barrier layer is formed of a material selected from the group consisting of silicon oxide, silicon nitride, oxynitride, tungsten nitride, titanium nitride, and tantalum nitride.



- 9. The trench capacitor according to claim 1, including a vertical transistor disposed in said trench.
- 10. A method of producing a trench capacitor, the method which comprises:

introducing a buried well into a substrate;

forming a trench in the substrate, the trench having an upper region and a lower region;

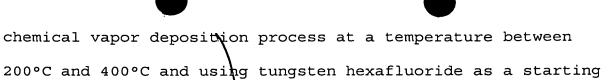
forming an insulation collar in the upper region;

providing a capacitor dielectric by forming a dielectric layer of tungsten oxide lining the lower region; and

filling the trench with a conductive trench filling for providing an inner capacitor electrode.

- 11. The method according to claim 10, which comprises forming the dielectric layer by oxidizing a tungsten-containing layer.
- 12. The method according to claim 11, which comprises forming the tungsten-containing layer from a material selected from the group consisting of tungsten nitride, tungsten silicide, and pure tungsten.

- 13. The method according to claim 10, which comprises forming the dielectric layer by oxidizing a tungsten-containing layer at a temperature between 200°C and 600°C in an atmosphere containing at least one element selected from the group consisting of O_2 , H_2O , N_2O , and NO.
- 14. The method according to claim 10, which comprises forming the dielectric layer by a reactive sputtering of tungsten in an oxygen-containing atmosphere.
- 15. The method according to claim 10, which comprises forming the dielectric layer as a layer with a dielectric constant greater than 50.
- 16. The method according to claim 10, which comprises subjecting the dielectric layer to a thermal treatment at a temperature between 550°C and 1100°C for providing the dielectric layer with a dielectric constant greater than 50.
- 17. The method according to claim 10, which comprises forming the conductive trench filling from a tungsten-containing material.
- 18. The method according to claim 10, which comprises forming a tungsten-containing layer by carrying out a selective



19. The method according to claim 10, which comprises:

forming a tungsten-containing layer from a material selected from the group consisting of tungsten nitride, tungsten silicide, and pure tungsten; and

producing the dielectric layer from the tungsten-containing layer.

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material.